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EXAMINER

LEUNG, JENNIFER A

ART UNIT

PAPER NUMBER

1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/069,261

Applicant(s)

DURST ET AL.

Examiner

Jennifer A. Leung

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-15 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-15 and 21-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Jennifer A. Leung

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicant's amendment submitted on November 15, 2007 has been received and carefully considered. Claims 1, 2 and 16-20 have been cancelled. Claims 3-15 and 21-27 are under consideration.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 3, 5, 7-9, 21 and 24-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Parker et al. (US 1,846,978).

Regarding claim 3, Parker et al. discloses an apparatus comprising a burner (see FIG. 8; page 4, line 78 to page 5, line 43; also, FIGs. 9 and 14) for combustion of a fuel/oxidant mixture within a combustion chamber (i.e., defined in part by the inner portion 35^x) in which a material is provided which endures a maximum temperature (i.e., a refractory material that appears to be labeled as 7^{x1} in FIG. 8; same as the refractory material 8 shown in FIG. 1 and described at page 2, lines 76-85), with one or several supply lines (e.g., a fuel supply line 15^x) and an additional supply line (i.e., pipe 40^x) connected to a low combustion value gas supply (i.e., a superheated steam source, generated from the water supplied by pipe 44^x and contained in tank 41^x) in order to conduct the low combustion value gas into the combustion chamber. The recitations with respect to "a maximum temperature" or a "temperature during combustion" have been

considered as functional language that adds no further patentable weight to the claim. Please note that the manner of operating a device does not differentiate apparatus claims from the prior art, and the recitation of a material or article worked upon does not further limit apparatus claims. See MPEP 2114, 2115.

Regarding claim 5, Parker et al. discloses a pre-mix chamber (i.e., defined by tube 6^x; FIG. 8) in which fuel and oxidant can be mixed before combustion.

Regarding claim 7, Parker et al. discloses that the pre-mix chamber 6^x is supplied with the additional gas (i.e., the superheated steam, via pipe 40^x and nozzle 9^x), where the additional gas is mixed with the fuel before the pre-mix chamber (i.e., the super heated steam is first mixed with the fuel at injector 51^x).

Regarding claim 8, the size of a lateral surface of a sidewall of the premix chamber in proportion to the volume of the pre-mix chamber is sufficient to accommodate any free energy from the detonation of gases in the pre-mix chamber (i.e., the lateral surface of the sidewall 6^x is sufficiently large relative to the volume of the pre-mix chamber; see FIG. 8).

Regarding claim 9, Parker et al. discloses that the pre-mix chamber defined by the tube 6^x is structurally capable of being cooled, i.e., by means of the water jacket located adjacent to the chamber (i.e., defined by the inner and outer portions 35^x, 36^x), and by means of the vaporizing coil 11^x located adjacent to the chamber.

Regarding claims 21 and 24, Parker et al. (FIG. 8; page 4, line 78 to page 5, line 43) discloses an apparatus comprising:

a combustion chamber in which a material is provided which endures a maximum temperature (i.e., a combustion chamber defined in part by inner portion 35^x, containing a

Art Unit: 1797

refractory material that appears to be labeled as 7^{X1} in FIG. 8; same as the refractory material 8 shown in FIG. 1 and described at page 2, lines 76-85);

at least one supply line (e.g., fuel supply pipe 15^X) in communication with the combustion chamber for supplying at least one of fuel and an oxidation agent to the combustion chamber;

a low combustion value gas supply (i.e., a superheated steam source, generated from the water supplied by pipe 44^X and contained in tank 41^X); and

an additional supply line (i.e., pipe 40^X) in communication with the low combustion value gas supply and the combustion chamber, for introducing a low combustion value gas (i.e., the superheated steam) into the combustion chamber.

Regarding claim 25, Parker et al. (FIG. 8; page 4, line 78 to page 5, line 43) discloses an apparatus comprising:

a combustion chamber in which a material is provided which endures a maximum temperature (i.e., a combustion chamber defined by inner portion 35^X, containing a refractory material that appears to be labeled as 7^{X1} in FIG. 8; same as the refractory material 8 shown in FIG. 1 and described at page 2, lines 76-85), the combustion chamber having an inlet and an outlet (see figure);

a pre-mix chamber (i.e., defined by tube 6^X) disposed upstream from an in communication with the inlet of the combustion chamber;

at least one supply line (e.g., fuel supply pipe 15^X) in communication with the pre-mix chamber for supplying at least one of fuel and an oxidation agent to the combustion chamber;

a low combustion value gas supply (i.e., a superheated steam source, generated from the water supplied by pipe 44^X and contained in tank 41^X); and

an additional supply line (i.e., pipe 40^x) in communication with the low combustion value gas supply and the pre-mix chamber for introducing the low combustion value gas into the combustion chamber.

Regarding claim 26, Parker et al. discloses that the at least one additional supply line 40^x (see FIG. 8) is in communication with the combustion chamber to deliver the low combustion value gas (i.e., the superheated steam) into the combustion chamber to mix the low combustion value gas with the fuel and the oxidation agent.

Regarding claim 27, Parker et al. discloses a pre-mix chamber (i.e., defined by tube 6^x; FIG. 8) connected with the at least one supply line that allows mixing of the low combustion value gas with the fuel/oxidant mixture.

Instant claims 3, 5, 7-9, 21 and 24-27 structurally read on the apparatus of Parker et al.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 3-9, 21, 22 and 24-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hays (US 2,087,031) in view of Onimaru et al. (US 5,616,021).

Regarding claims 3-5, 26 and 27, Hays discloses an apparatus comprising a burner (see figure and page 2, lines 17-74) for combusting a fuel/oxidant mixture within a combustion chamber **CT** in which a material (i.e., a mass of refractory material **Re**) is provided which endures a maximum temperature, with one or several supply lines for conducting fuel (i.e., via inlet pipe **P**) and an oxidant (i.e., via inlet conduit **A**) into the chamber. The apparatus also comprises a pre-mix chamber (i.e., comprising chamber **M**), in which the fuel and oxidant are mixed before combustion, and a low combustion value gas supply (i.e., the combustion products **HG** generated in the combustion chamber **CT**). Hays, however, is silent as to the apparatus comprising at least one additional supply line connected to the low combustion value gas supply, for conducting the low combustion value gas (i.e., the combustion products **HG**) to the pre-mix chamber **M** and into the combustion chamber **CT**.

Onimaru et al. teaches an apparatus comprising a burner (FIG. 1; column 4, line 43 to column 6, line 36) for combusting a fuel/oxidant mixture within a combustion chamber (i.e., defined by burning cylinder **22**), with one or several supply lines for conducting fuel (i.e., via supply pipe **33**) and an oxidant (i.e., via supply pipe **41**) into the chamber. Specifically, the apparatus comprises at least one additional supply line (i.e., an exhaust gas circulating pipe **51**) connected to a low combustion value gas supply (i.e., comprising the combustion products from the combustion chamber **22**), thereby conducting the low combustion value gas back into the combustion chamber **22** via the pre-mix chamber (i.e., defined by mixing cylinder **21**).

It would have been obvious for one of ordinary skill in the art at the time the invention

Art Unit: 1797

was made to provide at least one additional supply line, connected to the low combustion value gas supply, in order to conduct the low combustion value gas (i.e., the combustion products) to the pre-mix chamber **M** and into the combustion chamber **CT** in the apparatus of Hays, on the basis of suitability for the intended use thereof, because the additional supply line would allow for the combustion products to be recycled to the combustion chamber, thereby making it possible to properly maintain the fuel burning condition at a desirable and stable condition so as not to induce an excessive air supplying condition with respect to the supplied fuel in the event that the fuel supply amount is reduced, as taught by Onimaru et al. (see column 6, lines 26-36).

The recitations with respect to “a maximum temperature” or a “temperature during combustion” have been considered as functional language that adds no further patentable weight to the claim. Please note that the manner of operating a device does not differentiate apparatus claims from the prior art, and the recitation of a material or article worked upon does not further limit apparatus claims. See MPEP 2114, 2115.

Regarding claim 6, Hays further discloses that the pre-mix chamber **M** includes static mixing elements (i.e., a flow straightening plate **St**, a venturi plate **V**). The flow velocity component of the mixture in the pre-mix chamber **M** is inherently greater than the flame velocity in the combustion chamber **CT**, as evidenced by the impingement and mushrooming of the mixture over the surface of the refractory **Re** subsequent to its injection through the orifices **O** of the venturi plate **V** (see page 2, lines 45-55).

Regarding claim 7, the modified apparatus of Hays is structurally capable of providing the intended operation, since the pre-mix chamber **M**, as modified by the teachings of Onimaru et al., would be supplied with the additional gas (i.e., the recycled combustion products). In

addition, Onimaru et al. (FIG. 1) teaches that the additional supply line **51** is configured such that the additional gas (i.e., the exhaust gas) is mixed with the oxidant (i.e., at the intersection with conduit **41**) before entering a pre-mix chamber (i.e., defined by mixing cylinder **21**).

Regarding claim 8, in the apparatus of Hays, the size of the lateral surface of a sidewall **H** of the premix chamber **M** in proportion to the volume of the pre-mix chamber **M** is structurally capable of accommodating free energy from detonation of gases in the pre-mix chamber, since the size of the lateral surface of the sidewall **H** is sufficiently large, and the proportioning of the lateral surface and volume of the pre-mix chamber **M** in Hays appears similar to that of Applicant's apparatus, as shown in the figures.

Regarding claim 9, the pre-mix chamber **M** in the modified apparatus of Hays is structurally capable of being cooled (i.e., by a heat transfer medium flowing in the cooling jacket **J**, located adjacent to the premix chamber; see FIG. 1). Also, the pre-mix chamber **M** is structurally capable of being cooled by the atmospheric air present on the exterior side of wall **H**, adjacent to the pre-mix chamber **M**.

Regarding claims 21 and 22, Hays (see figure and page 2, lines 17-74) discloses an apparatus comprising: a combustion chamber **CT** in which a material (i.e., refractory material **Re**) is provided, which endures a maximum temperature; at least one supply line in communication with the combustion chamber **CT** for supplying at least one of fuel (i.e., via pipe **P**) and an oxidation agent (i.e., via pipe **A**), in order to conduct these into the combustion chamber; and a low combustion value gas supply (i.e., comprising the combustion products **HG** generated by the combustion chamber **CT**).

Hays, however, is silent as to the provision of an additional supply line in communication

Art Unit: 1797

with the low combustion value gas supply and the combustion chamber (i.e., in the form of an outlet line in communication with an outlet of the combustion chamber), for introducing the low combustion value gas (i.e., the combustion products **HG**) into the combustion chamber **CT** to mix with the at least one of fuel and an oxidation agent.

Onimaru et al. (FIG. 1; column 4, line 43 to column 6, line 36) teaches an apparatus comprising a combustion chamber (i.e., defined by cylinder **22**), at least one supply line in communication with the combustion chamber for supplying at least one of fuel (i.e., via supply pipe **33**) and an oxidation agent (i.e., via supply pipe **41**), in order to conduct these into the combustion chamber; and a low combustion value gas supply (i.e., the combustion products produced by the combustion chamber **22**). Specifically, the apparatus comprises at least one additional supply line (i.e., an exhaust gas circulating pipe **51**) connected to the low combustion value gas supply at the outlet of the combustion chamber, for conducting the low combustion value gas (i.e., the combustion products) back into the combustion chamber **22**.

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least one additional supply line connected to the low combustion value gas supply, in order to conduct the low combustion value gas into the combustion chamber in the apparatus of Hays, on the basis of suitability for the intended use thereof, because the additional supply line would allow for the combustion products to be recycled to the combustion chamber, thereby making it possible to properly maintain the fuel burning condition at a desirable and stable condition so as not to induce an excessive air supplying condition with respect to the supplied fuel when the fuel supply amount is reduced, as taught by Onimaru et al. (see column 6, lines 26-36).

Regarding claim 24, the low combustion value gas supply (i.e., the combustion products **HG**) comprises at least one of an inert gas source and a steam source, since the combustion reaction generates carbon dioxide and water vapor.

Regarding claim 25, Hays (see figure and page 2, lines 17-74) discloses an apparatus comprising: a combustion chamber **CT** in which a material (i.e., refractory material **Re**) is provided which endures a maximum temperature, the combustion chamber **CT** having an inlet and an outlet (i.e., see flow arrows in the figure); a pre-mix chamber (i.e., comprising chamber **M**) disposed upstream from and in communication with the inlet of the combustion chamber **CT**; at least one supply line in communication with the pre-mix chamber **M** for supplying at least one of fuel (i.e., via pipe **P**) and an oxidation agent (i.e., via pipe **A**) into the combustion chamber **CT**; and a low combustion value gas supply (i.e., the combustion products produced by the combustion chamber **CT**).

Hays, however, is silent as to the provision of an additional supply line in communication with the low combustion value gas supply and the pre-mix chamber **M**, for introducing the low combustion value gas (i.e., the combustion products) into the combustion chamber **CT**.

Onimaru et al. (FIG. 1; column 4, line 43 to column 6, line 36) teaches an apparatus comprising a combustion chamber (i.e., defined by cylinder **22**), at least one supply line in communication with the combustion chamber for supplying at least one of fuel (i.e., via supply pipe **33**) and an oxidation agent (i.e., via supply pipe **41**), in order to conduct these into the combustion chamber; and a low combustion value gas supply (i.e., the combustion products from the combustion chamber **22**). Specifically, the apparatus comprises at least one additional supply line (i.e., an exhaust gas circulating pipe **51**) connected to the low combustion value gas supply

Art Unit: 1797

at the outlet of the combustion chamber, for conducting the low combustion value gas (i.e., the combustion products) back into the combustion chamber, via a pre-mix chamber (i.e., defined by mixing tube 21).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide at least one additional supply line connected to the low combustion value gas supply, in order to conduct the low combustion value gas to the pre-mix chamber **M** and into the combustion chamber **CT** in the apparatus of Hays, on the basis of suitability for the intended use thereof, because the additional supply line would allow for the combustion products to be recycled to the combustion chamber, thereby making it possible to properly maintain the fuel burning condition at a desirable and stable condition so as not to induce an excessive air supplying condition with respect to the supplied fuel in the event that the fuel supply amount is reduced, as taught by Onimaru et al. (see column 6, lines 26-36).

4. Claims 10-13 rejected under 35 U.S.C. 103(a) as being unpatentable over Hays (US 2,087,031) in view of Onimaru et al. (US 5,616,021), as applied to claim 3 above, and further in view of Durst et al. (US 5,522,723).

Regarding claim 10, Hays discloses that combustion chamber **CT** contains a refractory material **Re**. Hays, however, does not specifically indicate that the material **Re** comprises a porous material with inter-connected hollow spaces, suitable in size for flame development. Durst et al. (FIG. 1) teaches a combustion chamber (i.e., defined by housing 1) in which a porous material 5 (see column 4, lines 23-30; column 2, lines 21-40) is provided, the porous material having inter-connected hollow spaces suitable in size for flame development. It would have been obvious for one of ordinary skill in the art at the time the invention was made to substitute

the porous material of Durst et al. for the refractory material **Re** in the modified apparatus of Hays, on the basis of suitability for the intended use thereof, because the porous material produces a high turbulence so that higher combustion rates can be achieved, as taught by Durst et al. (see column 2, line 65 to column 3, line 5).

Regarding claims 11 and 12, Hays is silent as to the combustion chamber containing a porous material whose porosity changes over to larger pores in the direction toward the development of flame, wherein the combustion chamber has at least two zones with material of differing pore size, between which, the material has a pore size that provides the critical Peclet number. Durst et al. (FIG. 1; column 8, lines 48-60) teaches a combustion chamber (i.e., defined by housing 1) containing a porous material **5** whose porosity changes over to larger pores in the direction toward the development of flame, wherein the combustion chamber has at least two zones **A** and **C** with a material of differing pore size, between which, the material has a pore size (in zone **B**) that provides the critical Peclet number. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a porous material having the claimed porosity configuration in the combustion chamber of the modified apparatus of Hays, on the basis of suitability for the intended use thereof, because the porosity configuration would provide a defined position for the flame development, thereby increasing burner stability, as taught by Durst (see column 3, lines 33-51).

Regarding claim 13, Durst further teaches that the porous material **5** may comprise a packing material, such as spheres (see column 4, lines 45-67).

5. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hays (US 2,087,031) in view of Onimaru et al. (US 5,616,021) and Durst et al. (US 5,522,723), as

applied to claims 10 and 13 above, and further in view of Martin et al. (US 5,165,884).

Regarding claim 14, Hays further discloses the provision of a grid **Gr** for retaining the refractory material **Re** within the combustion chamber. The collective teaching of Hays, Onimaru et al. and Durst et al., however, is silent as to the provision of a grid at the border area, to prevent discharge of the bodies from one zone into the other. Martin et al. teaches a similar combustion device, wherein gas permeable barriers can be utilized to maintain the integrity of the matrix of porous bodies, so that adjacent layers of materials of differing sizes do not become mixed (see column 10, lines 26-34). It would have been obvious for one of ordinary skill in the art at the time the invention was made to further provide a grid at the border area in the modified apparatus of Hays, on the basis of suitability for the intended use thereof, because the grid would help control the location of the various sized materials in the respective zones.

Regarding claim 15, in the modified apparatus of Hays, the grid would be structurally capable of being cooled, by means of the heat transfer medium flowing in the jacket **J** surrounding the combustion chamber **CT** (see figure).

6. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hays (US 2,087,031) in view of Onimaru et al. (US 5,616,021), as applied to claims 21 and 22 above, and further in view of Yamane et al. (US 3,982,878).

The collective teaching of Hays and Onimaru et al. is silent as to the provision of a heat exchanger, such that the outlet line from the combustion chamber is in communication with an inlet of the heat exchanger, and the outlet of the heat exchanger is in communication with the additional supply line. Yamane et al. (see FIG. 3; column 3, lines 53-66) teaches an apparatus comprising a combustion chamber **10** with supply lines for fuel **12** and oxidant **14**, the apparatus

further comprising a heat exchanger 50, wherein the outlet line 48 from the combustion chamber 10 is in communication with the inlet of the heat exchanger 50, and the outlet of the heat exchanger 50 is in communication with an additional supply line (not labeled, see figure), for feeding the combustion products back into the combustion chamber 10. It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide a heat exchanger to the modified apparatus of Hays, on the basis of suitability for the intended use thereof, because the heat exchanger would allow for water contained in the combustion products to be recovered, before feeding the combustion products in a dehydrated form, back into the combustion chamber, as taught by Yamane et al.

Response to Arguments

7. Applicant's arguments filed November 15, 2007 have been fully considered but they are not persuasive.

A. Comments regarding the rejection of claims 3, 5, 7-9, 21 and 24-27 under 35 U.S.C. 102(b) as being anticipated by Parker et al. (US 1,846,978).

Applicant (at the second paragraph on page 8) argues,

“The function and intent of the burner according to Parker is completely different from the inventive burner. First, the super heated steam supplied through pipe 40^x (Fig. 8 of Parker) to the combustion chamber, does not serve to decrease the temperature below the maximum temperature but is used to vaporize the oil and to decrease the development of carbon or smoke (Parker, p. 5, l. 29-39). Moreover, the secondary combustion chamber 7^x does not correspond to a premix chamber. It is outlined in the description that the premix chamber of the inventive burner exclusively serves to mix the fuel and oxidant without combustion. In the invention, a combustion in the premix chamber is effectively avoided by means of the flame barrier provided by the accordingly adapted pore burner

(critical Peclet-number).”

The Examiner respectfully disagrees.

Firstly, Applicant argues that the Parker device fails to anticipate the claims, since Parker does not mention that the steam is used for decreasing the combustion temperature below a maximum temperature. Instead, Parker only mentions that the steam is used to vaporize the oil and decrease the development of carbon or smoke.

Applicant’s argument is not found persuasive, since the mere recognition of latent properties in the prior art does not render an otherwise known invention to be patentable. As indicated in Applicant’s specification (page 4, third paragraph) as well as instant claim 24, the provision of steam within the combustion chamber would inherently lower the combustion temperature below a maximum temperature.

In any event, a claim containing a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus if the prior art apparatus teaches all the structural limitations of the claim. Furthermore, expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim, and the inclusion of a material worked upon by a structure being claimed does not impart patentability to the claims. See MPEP 2114.

Secondly, Applicant argues that the secondary combustion chamber 7^x does not correspond to a premix chamber, since Parker et al. discloses that combustion occurs within the secondary combustion chamber 7^x. Please note, however, that the Examiner identified the premix chamber by tube 6^x (see, e.g., claim 5 above). Mixing of fuel and oxidant occurs within tube

6^x prior to its combustion within chamber 7^x.

Thirdly, Applicant's argument with respect to a "critical Peclet-number" is not found persuasive, since claims 11 and 12 (which recite this feature) were not rejected under 35 U.S.C. 102(b) to Parker et al.

B. Comments regarding the rejection of claims 10-13 under 35 U.S.C. 103(a) as being unpatentable over Hays (US 2,087,031) in view of Onimaru et al. (US 5,616,021), as applied to claim 3 above, and further in view of Durst et al. (US 5,522,723).

Applicant (beginning at the last paragraph on page 8) argues,

“Hays and Onimaru are cited against original claims 10, 11 together with Durst.

Since the principle underlying the fuel burner heater according to Onimaru is completely different than the radiant based flameless burners according to Durst or Hays, it is not evident as to why Onimaru should be combined with the aforementioned references. Onimaru discloses to circulate the exhaust fumes for stabilizing a free burning flame which is not present in the burner of Durst. Therefore, Applicants believe that the idea can not be extracted from Onimaru to conduct a low combustion value gas into the combustion chamber of a pore burner to decrease the combustion temperature.

Since the prior art cited by the Examiner does not contain any motivations to combine the respective teachings disclosed in the art the subject matter of the present application appears to involve an inventive step.

The crucial features of Applicants' invention comprise the additional supply line which is connected to a low combustion value gas supply as indicated in claim 3. This feature is also found in independent claims 21 and 25. Moreover, the flame barrier which results from the porous material in the combustion chamber (claim 10) and the critical Peclet number for the pore size (claim 11) are responsible together with the additional supply line for the superior advantages of the invention. A further improvement of the invention is obtained by the premix chamber according to claim 5.”

It appears that Applicant is arguing that there would have been no motivation to combine the teachings of Hayes, Onimaru and Durst, since Hayes and Durst both disclose burner devices containing a porous combustion chamber material, whereas Onimaru et al. discloses a burner device that does not contain a porous combustion chamber material.

The Examiner respectfully disagrees.

The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. One must ask whether the improvement is more than the predictable use of prior art elements according to their established functions. *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (2007).

In the instant case, the secondary reference to Onimaru et al. teaches that the provision of an additional supply line, which recycles at least a portion of the low combustion value gas (i.e., the combustion products of the device) back into the pre-mix chamber and combustion chamber of the device, makes it possible to properly maintain the fuel burning condition at a desirable and stable condition so as not to induce an excessive air supplying condition with respect to the supplied fuel in the event that the fuel supply amount is reduced (see, e.g., column 6, lines 26-36). A person of ordinary skill in the art would recognize that this feature would predictably

Art Unit: 1797

improve other burner devices, such as the Hayes device, in the same way, e.g., by allowing for the combustion of fuel within the pores of the combustion chamber CT to occur in a stable manner, even in the event of a change in the amount of fuel being supplied to the combustion.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Art Unit: 1797

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/Jennifer A. Leung/
Examiner, Art Unit 1797
January 11, 2008